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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|--|-------------|----------------------|----------------------------------|------------------------|
| 10/520,900 | 01/10/2005 | Marc Sommer | 510.1113 | 4817 |
| 23280 | 7590 | 09/20/2007 | | |
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| | | | EXAMINER SEIFU, LESSANEWORK T | |
| | | | ART UNIT 1743 | PAPER NUMBER |
| | | | MAIL DATE 09/20/2007 | DELIVERY MODE PAPER |

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/520,900

Applicant(s)

SOMMER ET AL.

Examiner

Lessanework T. Seifu

Art Unit

1709

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 January 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 14-28 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 14-20, 25 and 26 is/are rejected.
- 7) ☒ Claim(s) 21-24, 27 and 28 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 10 January 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 01/10/05
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- ☐ Notice of Informal Patent Application
- ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 16 and 17 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 16 and 17 recite "hydrocarbon-containing compound ($C_n H_m$)" The characters "n" and "m" are not defined and therefore the claims are rendered indefinite.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

5. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims 14 and 16-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Asou et al. (US 2002/0150800 A1) in view of Edlund et al. (US 6,221,117 B1).

Regarding claims 14 and 16-18 Asou et al. disclose a method for starting a gas generation system for generating a hydrogen-containing gas for operating a fuel cell, wherein the system includes at least one converting device (3) configured to convert starting substances into the hydrogen-containing gas, at least one removal device (4) configured to remove undesirable gas constituents from the hydrogen-containing gas, and a starting burner (8), the method comprising:

in a first step, burning at least one fuel in the starting burner so as to from hot exhaust gases, using a residual heat from the hot exhaust gases to heat at least one further component (see parag. [0043]);

in a second step, adding starting substances at an initial quantitative ratio with respect to one another to respective components of the devices after a starting temperature has

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been reached (see parag. [0044] and [0019]). In the reference Asou et al., air, water, and raw material (hydrocarbon fuels) are construed as applicants starting substances. Asou et al. disclosure of a controller unit increasing the amount of raw material to be supplied from material supply unit at the time of start-up of the hydrogen generator in a predetermine ratio meets the claim limitation of adding starting substances at an initial quantitative ratio with respect to one another.

...in a third step, continuously changing the quantitative ratio from the initial quantitative ratio toward an operational quantitative ratio (see parag. [0045] and [0019]). Asou et al. disclosure of a controller unit increasing the amount of raw material to be supplied from material supply unit at the time of start-up of the hydrogen generator in a predetermine ratio meets the above claim limitation of continuously changing the quantitative ratio from the initial quantitative ratio toward an operational quantitative ratio.

Asou et al. are however silent with respect to their hydrogen generator comprising a conditioning device to condition some of the starting substances, and heating the conditioning device using hot exhaust gases. Asou et al. also do not disclose a process step of electrically heating the converting device (reformer).

Edlund et al. disclose a hydrogen producing fuel processing system, the reference further discloses upon initial startup process, a burner (920) is used to heat a device configured to vaporize feedstock for steam reforming process, which is

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construed as applicants' conditioning device configured to condition the starting substances (see col. 29, lines 17-33 and fig. 25). The reference further discloses air inlet coil may be routed through combustion region to heat the air (see col. 7, lines 8-12). Edlund et al. further disclose electrical heater for heating converting device (reformer (12)) to initiate operation of the reformer. The reference further discloses the feedstock, which includes hydrocarbon-containing compound, can also be heated with an electric resistant heater (see fig. 3 and col. 8, lines 24-34).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the method for starting a gas generation system disclosed by Asou et al., and include a device configured to vaporize and/or heat feedstock according to the teaching of Edlund et al. in the reformer unit of Asou et al. for providing steam to the reformer, and heat the reformer (converting device) of Asou et al. by electrical heater at start-up in order to raise the temperature of the reforming catalyst to sufficiently high temperature.

Regarding claims 19 and 20, Asou et al. does not disclose that the purifying unit (5) which is construed as applicants' "at least one further component" includes a hydrogen separation module including at least one membrane selectively permeable to hydrogen. Edlund et al. disclose hydrogen producing fuel processing system, the reference further discloses hydrogen separation module including a membrane selectively permeable to hydrogen (see col. 5, lines 47-50). It would have been obvious

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to one having ordinary skill in the art at the time the invention was made to have included a hydrogen separation module including a membrane selectively permeable to hydrogen as disclosed in Edlund et al. in the purifying unit of Asou et al. because, Edlund et al. disclose that a membrane selectively permeable to hydrogen can maximize harvest of hydrogen from reforming process (see col. 1, lines 54-67).

7. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Asou et al. (US 2002/0150800 A1) in view of Edlund et al. (US 6,221,117 B1) as applied to claim 14 above, and further in view of Shunsuke (JP 02017306 A).

Regarding claim 15, as shown above Asou et al. and Edlund et al. combined meet the limitation of claim 14. The above references however are silent with respect to the type of burner used in their gas generation system. Shunsuke discloses a porous burner (see translated Abstract).

It would have been obvious to one having ordinary skill in the art at the time the invention was made, in view of Shunsuke, to have selected a porous burner for the gas generation system of Asou et al. because, Shunsuke discloses their porous burner reduces volume of an ignition means and improves ignition characteristics (see Abstract).

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8. Claims 25 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Asou et al. (US 2002/0150800 A1) in view of Edlund et al. (US 6,221,117 B1) as applied to claim 14 above, and further in view of Iwasaki (WO 01/92147).

Regarding claims 25 and 26 as shown above, Asou et al. and Edlund et al. combined meet the limitation of claim 14. Asou et al. further disclose that the generated gas which includes carbon monoxide (CO) and hydrogen (H₂) exiting from the reformer is burnt with air in the burner during the startup process so as to further heat reaction units which include a shift stage (see parag. [0043] and [0044]). The references Asou et al. and Edlund et al. do not disclose autothermal reformer in their gas generation system. Iwasaki discloses a fuel reforming system. Iwasaki further discloses autothermal reformer as a converting device (see Figure).

It would have been obvious to one having ordinary skill in the art at the time the invention was made, in view of Iwasaki, to have used an autothermal reformer for the gas generation system of Asou et al. because, Iwasaki discloses autothermal reformer can be operated in autothermal condition for balancing exothermic and endothermic reactions (see pg. 2, first paragraph).

Allowable Subject Matter

1. Claims 21-24, 27 and 28 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The above claims would be allowable because the prior art fails to disclose or render obvious a method for starting a gas generation system, wherein the system includes at least one converting device, at least one conditioning device, at least one removal device configured to remove undesirable gas constituents from the hydrogen-containing gas, and a starting burner, the method comprising: in a first step, burning at least one fuel in the starting burner so as to from hot exhaust gases, heating the conditioning device using the hot exhaust gases, using a residual heat from the hot exhaust gases to heat at least one further component, and electrically heating the at least one converting device;

in a second step, adding starting substances at an initial quantitative ratio with respect to one another to respective components of the devices after a starting temperature has been reached; and in a third step, continuously changing the quantitative ratio from the initial quantitative ratio toward an operational quantitative ratio, wherein the at least one further component includes a heat exchanger of a cooling circuit, wherein the cooling circuit heats the fuel cell. The method further comprising, during an initial stage of the second step, passing at least some of the gas generated in the at least one converting

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device through a bypass around a fuel cell and a removal device and feeding the gas directly to a catalytic burner.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lessanework T. Seifu whose telephone number is 571-270-3153. The examiner can normally be reached on Mon-Thr 7:00am-5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Walter Griffin can be reached on 571-272-1447. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

LS


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SUPERVISORY PATENT EXAMINER